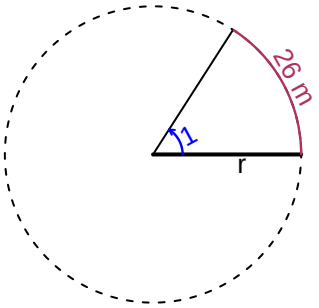
Name: Date:

Trig Final (SLTN v693)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 26 meters. The angle measure is 1 radians. How long is the radius in meters?

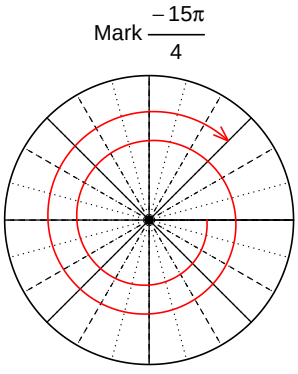


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

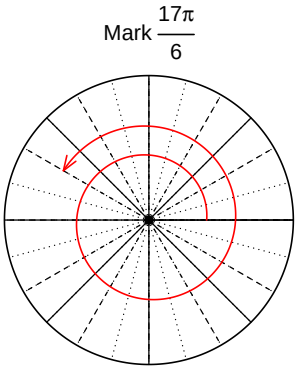
$r = 26$ meters.

Question 2

Consider angles $\frac{-15\pi}{4}$ and $\frac{17\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{-15\pi}{4}\right)$ and $\sin\left(\frac{17\pi}{6}\right)$ by using a unit circle (provided separately).



Find $\cos(-15\pi/4)$



Find $\sin(17\pi/6)$

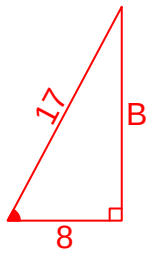
$\cos(-15\pi/4) = \frac{\sqrt{2}}{2}$

$\sin(17\pi/6) = \frac{1}{2}$

Question 3

If $\cos(\theta) = \frac{-8}{17}$, and θ is in quadrant III, determine an exact value for $\tan(\theta)$.

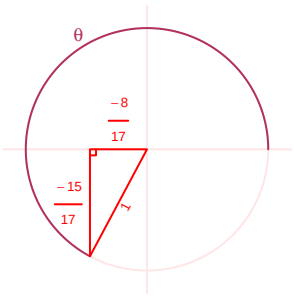
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$8^2 + B^2 = 17^2$$
$$B = \sqrt{17^2 - 8^2}$$
$$B = 15$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\tan(\theta) = \frac{\frac{-15}{17}}{\frac{-8}{17}} = \frac{15}{8}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 8.91 Hz, an amplitude of 6.74 meters, and a midline at $y = 3.92$ meters. At $t = 0$, the mass is at the maximum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 6.74\cos(2\pi 8.91t) + 3.92$$

or

$$y = 6.74\cos(17.82\pi t) + 3.92$$

or

$$y = 6.74\cos(55.98t) + 3.92$$